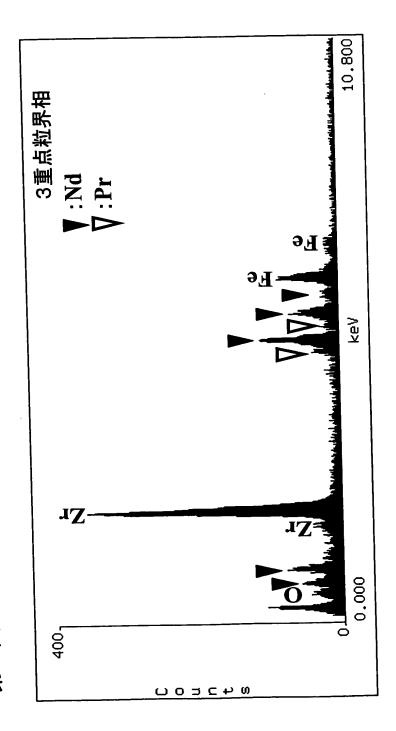
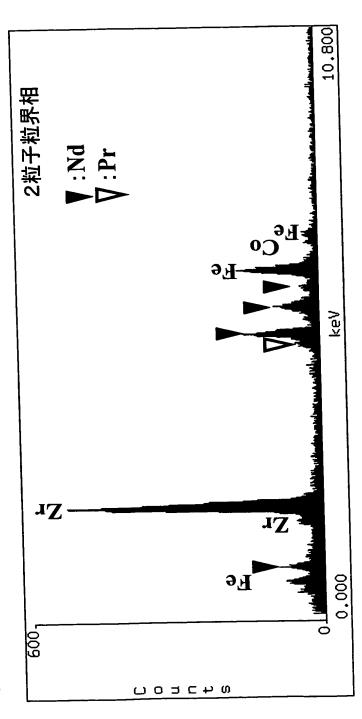
Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 1 of 33



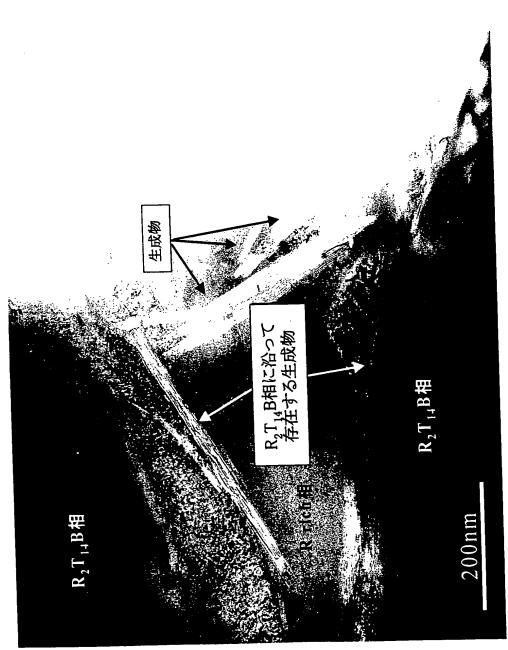
第1図

Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 2 of 33



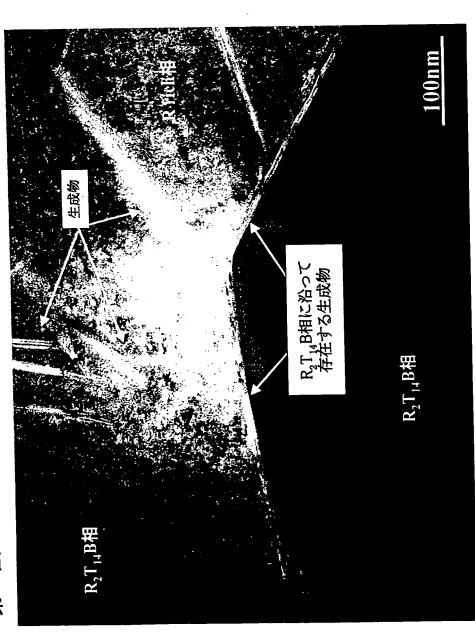
第2図

Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 3 of 33



第3図

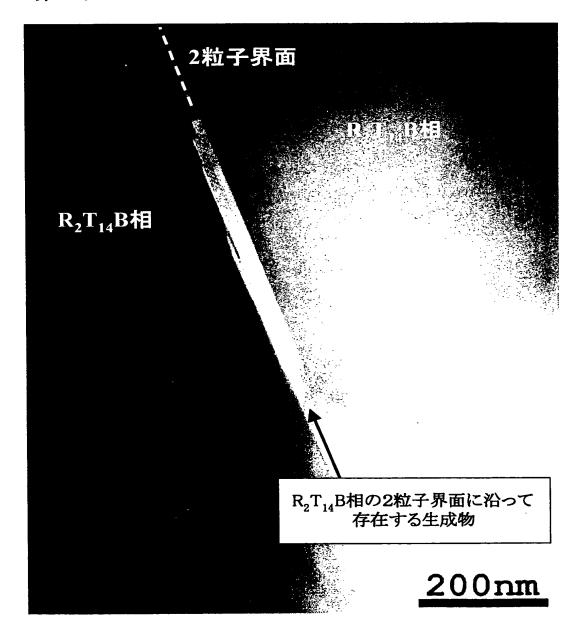
Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 4 of 33



第4図

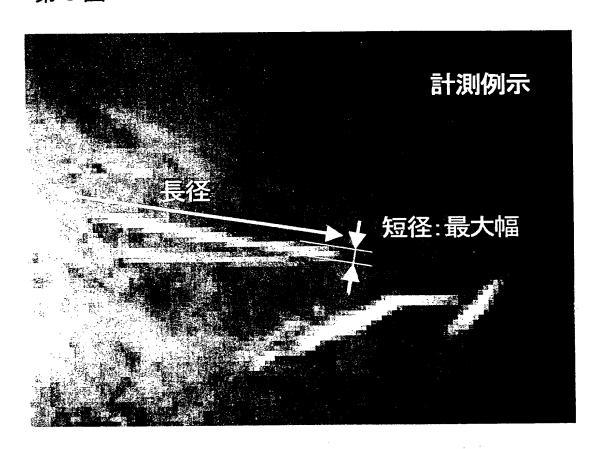
Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 5 of 33

第5図



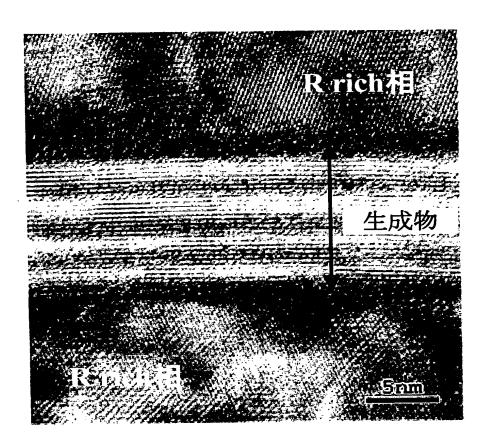
Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 6 of 33

第6図



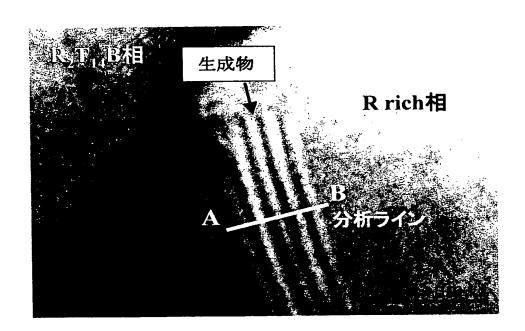
Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 7 of 33

第7図



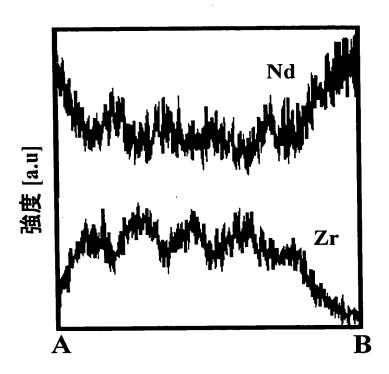
Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 8 of 33

第8図



Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 9 of 33

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第10図



Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 11 of 33

合金a1	低R合金 23.6Nd-6Pr-0.3Dy-1.1B-0.05Cu-0.2Al-bal.Fe(wt. %)
合金a2	Zr入り低R合金 23.6Nd-6Pr-0.3Dy-1.1B-0.05Cu-0.2Al-0.32Zr-bal.Fe(wt. %)
合 会 3	Zr入り低R合金 15.7Nd-6Pr-8.1Dy-1.1B-0.05Cu-0.2AI-0.15Zr-bal.Fe(wt. %)
合 金 金	Zr入り低R合金 23.9Ndー6Prー1.1Bー0.05Cuー0.2AIー0.15Zrーbal.Fe(wt. %)
合金a5	Zr入り低R合金(高AI) 23.6Nd-6Pr-0.3Dy-1.1B-0.05Cu-0.42AI-0.12Zr-bal.Fe(wt. %)
合金a6	Zr入り低R合金(Al無) 23.6Nd-6Pr-0.3Dy-1.1B-0.05Cu-0.12Zr-bal.Fe(wt. %)
合金a7	Zr入り低R合金 27.9Nd-0.1Dy-1.1B-0.03Cu-0.05Al-0.08Zr-bal.Fe(wt. %)
合金a8	Zr入り低R合金 23.7Nd-6Pr-0.2Dy-1.6B-0.3Cu-0.25Al-0.3Zr-bal.Fe(wt. %)
合金61	高R合金(B無) 40.6Nd-0.05Cu-5Co-0.2Al-bal.Fe(wt. %)
合金b2	Zr入り高R合金(B有) 40.6Nd-0.5B-0.05Cu-5Co-0.2Al-3.1Zr-bal.Fe(wt. %)
合金b3	高R合金(B, Al無) 40.6Nd-0.05Cu-5Co-bal.Fe(wt. %)
合金b4	高R合金(B無) 35.1Nd-0.03Cu-2Co-0.05Al-bal.Fe(wt. %)
今 令 令	高R合金(B無) 40.6Nd-0.3Cu-20Co-0.25Al-bal.Fe(wt. %)

Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 12 of 33

								1 / 11		
		酸素量	400	直の今条	体結温度	<u> </u>	골 (HK/HCJ	Br+0.1 ×	CV 画
ò	最終組成(wt. %)	_	_		Contraction (Contraction)	(KG)	(KO9)	(2)	22	
		1210	o ⊕	合金b1	1	13.91	12.59	38	15.17	
	1 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05cu-0.2Al-0.3cg	2 3				13.94	13.28	22	15.27	88
	2 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.01Zr	1290				13.05	13 29	. 79	15.28	70
	3 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2AI-0.5Co-0.02Zr	160				9.9	12.24	96	15.29	99
	AFE-24 9Nd-54Pr-0.4Dy-1B-0.05Cu-0.2AI-0.5Co-0.03Zr	1360	•			3.90	10:0	3 8	15.20	7.2
	7 C E C 4B. 0 4D 1B-0 05C 0 2AI-0 5Co-0.05Zr	1090	が を を を を を の の	\$ \$₽1		13.96	13.33	<u> </u>	13.63	*
		1190	7 B H G	3 4		13.97	13.31	96	15.30	78
	_	2 5				13.99	13.64	97	15.35	101
_	7 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2AI-0.5Co-0.2Uzr	2				1394	13.75	97	15.32	66
	8 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.25Zr	1320				2 5	12.85	86	15.24	110
	9 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.30Zr	1240				20.51		8	15.99	159
	10 Ea-24 RN4-5.5Pr-0.3Dv-1B-0.05Cu-0.2Al-0.5Co-0.05Zr	1350	_		1070°C	13.89	13.32	3 8	77.0	7.5
		1400		•		13.84	13.43	66	0	*
		1170	合 会 1	か供わ」+		13.78	13.56	97	15.14	257
	_	2 6		1 1 1		13.71	13.71	86	15.08	281
	13 Fe-24.8Nd-5.5Pr-0.3Dy-1B-0.05Cu-0.2Al-0.5Co-0.25cr	0221				13.62	13.88	86	15.01	275
	14 Fe-24.8Nd-5.5Pr-0.3Dy-1B-0.05Cu-0.2Al-0.5Co-0.30Zr	1310	44	4461		200	7	54	15.03	1
Ĺ	15 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2AI-0.5Co	1888	ПЖа	E E		20.5		5 5	15.20	ā
	16 Fe-24 9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.10Zr	1820	合金a1+			13.97	12.33	9.	27.51	8
	12 E24 0Nd=5 4Pr-0 4Dv-1B-0.05Cu-0.2AI-0.5Co-0.20Zr	1920	合金a2	- 合語 - Danger		13.98	12.58	<u></u>	13.24	96
		1870				13.93	12.81	88	15.21	97
	18 Fe-24.3Nd-3.4FF 0.4D7 15 0.500g 0.5.	1800		合金b1+		13.81	12.39	96	15.05	223
	19 Fe-24.8Nd-5.3PF-0.3D9-1B-0.33dd 0.2A, 0.3dd 0.2A		e H U	合金b2		13.75	12.55	97	15.01	263
_	20 Fe-24.8Nd-5.5Pr-0.3Dy-1B-0.030u-0.2MI-0.300 0.202	4								

第12図

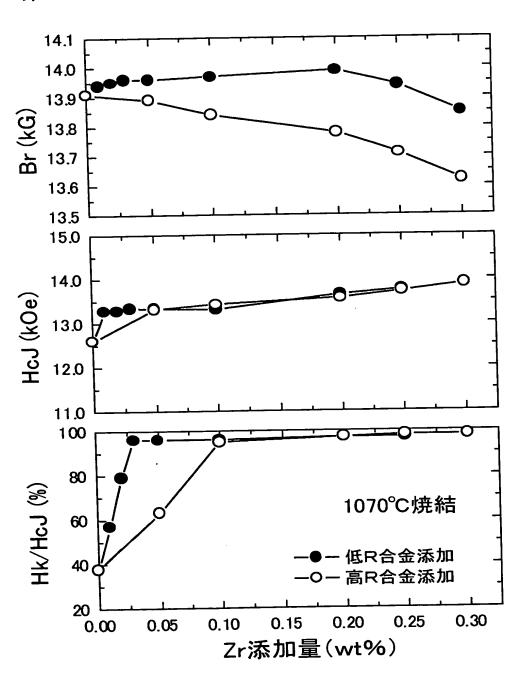
Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 13 of 33

R	ZI 0 -	- E				å	H	Hk/Hc.	R-101X
8 2	最終組成(wt. %)	一般来域 (nom)	低R合金	高R合金	焼結温度	(KG)	(kOe)		HoJ
	CAO-1400 CAO CA	↓	φ 1040-1	合金b1		13.94	13.24	98	15.26
2	21 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.000u-0.2M 0.000	╄	;		l		000	2	15.28
22	22 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.01Zr	1260				13.94	13.23	<u></u>	07:61
- 2	23 Fe-24 9Nd-5 4Pr-0.4Dv-1B-0.05Cu-0.2AI-0.5Co-0.02Zr	1180				13.95	13.19	94	15.27
3 8	23 C 24:010 C 1:01 C 1:02 C 1:05 C 1:0	1360 4	合金a1+	 		13.94	13.19	94	15.26
	24 6 24:010 0:4: 0 0:5: 0 0:	1110	合金a2	1 1		13.94	13.23	92	15.26
2 5	TE 24:300 3:41 0:42 0: 0:00 0:00 0:00 0:00 0:00 0:00 0	1170				13.94	13.28	92	15.27
- 5 0	26 Fe-24.9Nd-5.4Pr-0.4Dy-1D-0.030d 0.2Al 0.300 0.131					13.91	13.55	92	15.27
27	27 Fe-24,9Nd-5,4Pr-0,4Dy-1B-0.05Cu-0,2AI-0,5Co-0,2Uzr	M7-			000				,
8	28 Fe-25 0Nd-5,4Pr-0.3Dy-1B-0.05Cu-0.2Al-0.5Co-0.05Zr	1300		\$ \$51 \$	2.0901	13.88	12.96	96 	15.18
	29 Fe-24 8Nd-5 5Pr-0.3Dv-1B-0.05Cu-0.2AI-0.5Co-0.10Zr	1370	合金a1	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1		13.85	12.76	97	15.13
<u> </u>	20 E 21 SNJ - 5 SP - 0 30 V - 1 B - 0 05 Cu - 0 2 Al - 0.5 Co - 0.20 Zr	1250				13.68	12.58	88	14.94
ة أ أ	24 F. 24 ON J. 5 AD. O AD 18-0 05C - 0 01AI-0 5Co-0.10Zr	1220				14.15	11.20	92	15.27
	21 FE 24.3NG 3.41 3.423 12 3.333 3.41 3.50 -0.10Zr		•			14.14	12.49	96	15.39
3 6 	32 Fe=Z4,8Nd=3,4FT 0.4Dy 1D 0.0000 0.000 0		合金a5十 合金a6	合金b1 + 合金b3		14.13	12.60	95	15.39
ત રે 	33 FE-Z4,8NG-3,4FT 0.4Dy 1D 0.000 0.00 0.00 0.00 0.00 0.00 0.00	1180	i i] i		13.87	13.27	97	15.20
ب م	TFE-24.5ING-3.4FT-0.4EV ID 0.0004 0.00. 0.000 0.00.	1230				13.61	13.00	96	14.91
.	35 Fe-24.9Nd-5.4FF-U.4Dy-1D-0.030u-0.4Al 0.300 0.102								

第一の図

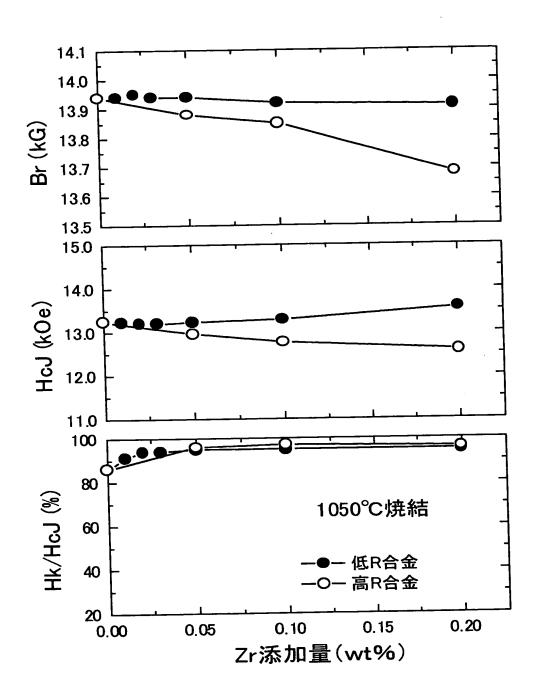
Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 14 of 33

第14図



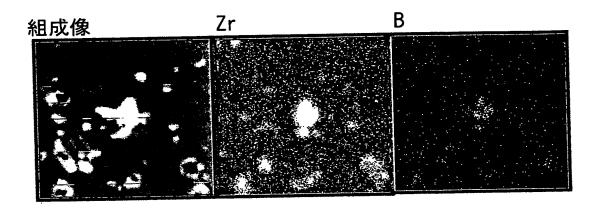
Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 15 of 33

第15図



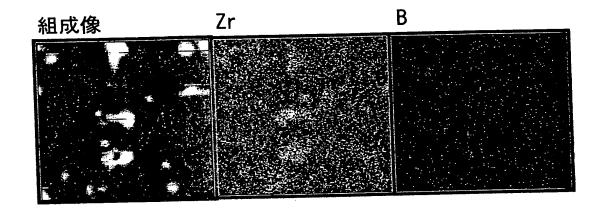
Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 16 of 33

第16図

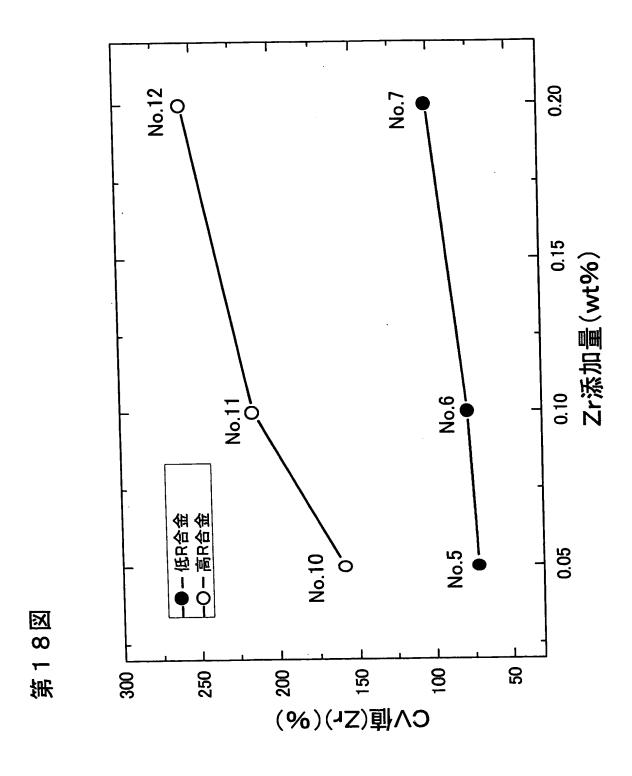


Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 17 of 33

第17図



Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 18 of 33



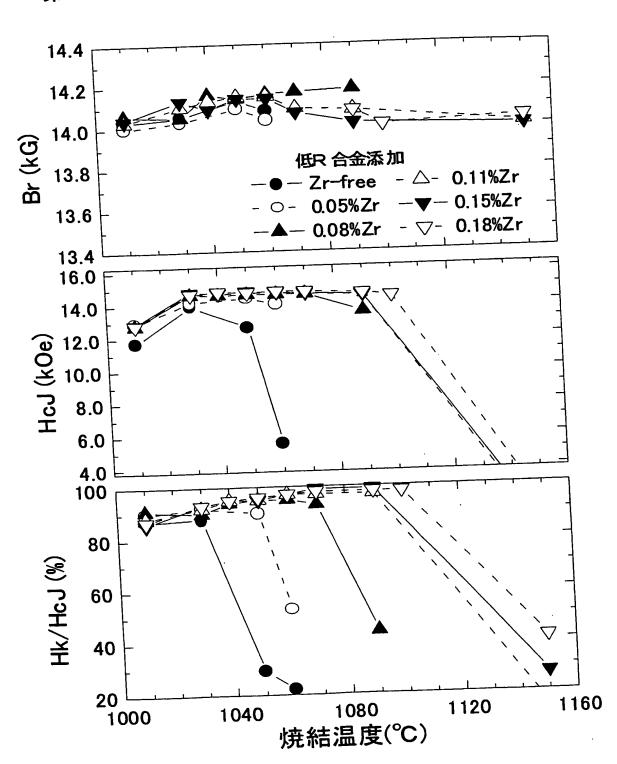
Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 19 of 33

第19図

No.	最終組成(wt. %)	酸素量	焼結温度	Br (kG)	HcJ (kOe)	Hk/HcJ (%)	Br+0.1 × HcJ	CV値
ļ		(ppm)	1010℃	14.03	11.68	87	15.20	
36 37		680	1030℃	14.05	13.92	88	15.44	
38	Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co	080	1050℃	14.13	12.64	29	15.39	
39			1060℃	14.08	5.53	22	14.63	
40			1010℃	14.00	12.84	90	15.29	_ 1
41		670	1030℃	14.03	14.17	92	15.44	
42	Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.05Zr	0.0	1050℃	14.09	14.37	90	15.53	_
43			1060℃	14.04	14.00	53	15.44	_
44			1010℃	14.06	12,76	91	15.33	
45			1030℃	14.05	14.61	90	15.51	
46			1040℃	14.16	14.59	94	15.62	
47	Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.08Zr	870	1050℃	14.14	14.61	95	15.60	
48	-	l	1060℃	14.16	14.60	95	15.62	_
49			1070℃	14.17	14.60	93	15.63	
50			1090℃	14.18	13.51	44	15.53	
51			1010℃	14.03	12.85	88	15.31	65
52		İ	1030℃	14.10	14.67	92	15.57	71
53			1040℃	14.13	14.66	95	15.59	77
54	 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.11Zr	700	1050℃	14.15	14.71	95	15.62	75
55	Fe-24.5140-5.4F1-0.4Dy-1B-0.0500 0.2A1 0.500 0.1121		1060℃	14.15	14.69	97	15.62	72
56		1	1070℃	14.09	14.61	97	15.55	75
57		1	1090℃	14.08	14.49	97	15.53	81
58		<u> </u>	1150℃	14.01	0.11	14	14.02	142
59		1	1010℃	14.04	12.85	86	15.32	68
60		l	1030℃	14.13	14.72	93	15.60	75
61			1040℃	14.09	14.77	95	15.57	72
62	Fe-24.9Nd-5.4Pr-0.4Dv-1B-0.05Cu-0.2AI-0.5Co-0.15Zr	740	1050℃	1	14.79	95	15.62	80
63	To Exist distribution of the state of the st		1060℃	1	14.72	97	15.61	85
64			1070℃	,	14.66	99	15.53	88
65			1090℃	1	14.51	99	15.47	91
66		 	1150℃	+	0.50	27	14.05	150
67			1010℃	1 .0.00	12.81	87	15.26	
68		1	1030℃	1	14.67	93	15.54	
69		1	1040℃ 1050℃	1	14.80	95	15.61	=
70	- 040NU FAB 04B 4B 0050 00N 050 0107		1060℃	1	14.72	96	15.52	
71	Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.18Z	r 810	1050 C	1	14.78	97	15.65	-
72		1	1090℃	1	14.76	98	15.51	<u> </u>
73			1100°C	1	14.63	98	15.54	-
74		1	1150°C	1	14.45	98	15.46	H=
75			111000	14.04	1.75	41	14.22	

Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 20 of 33

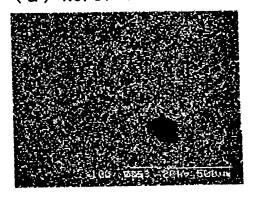
第20図



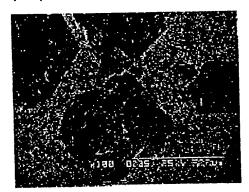
Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 21 of 33

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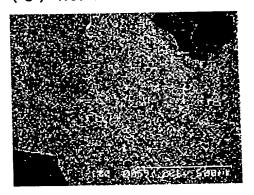
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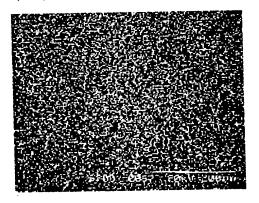
(b) No. 39 1060°C Zr-free



(c) No. 43 1060°C 0. 05%Zr

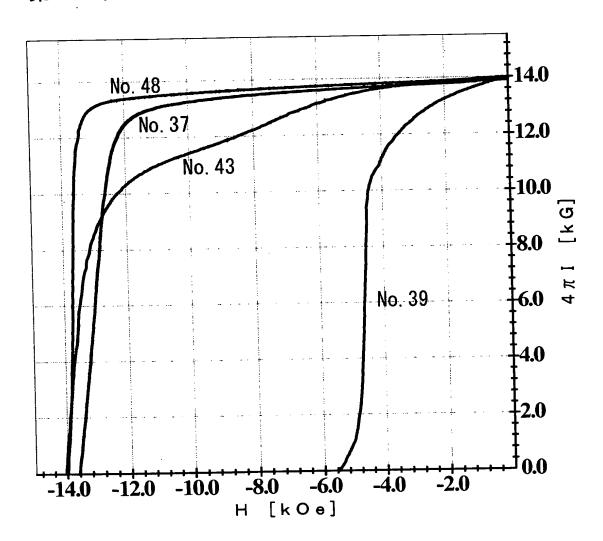


(d) No. 48 1060°C 0. 08Zr



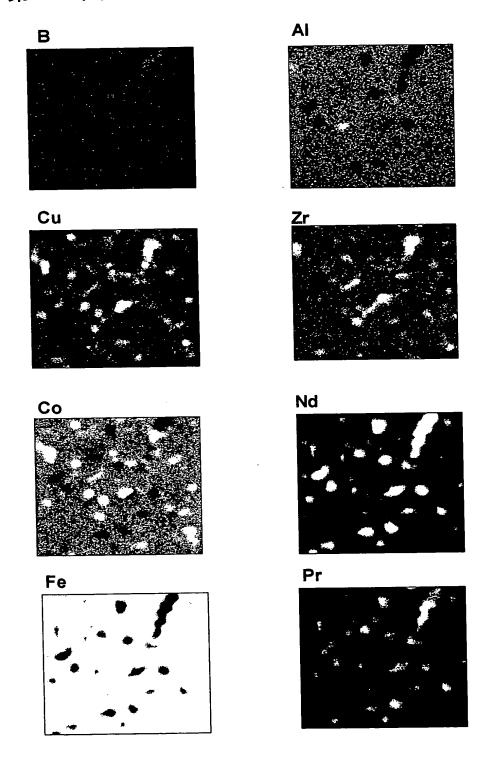
Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 22 of 33

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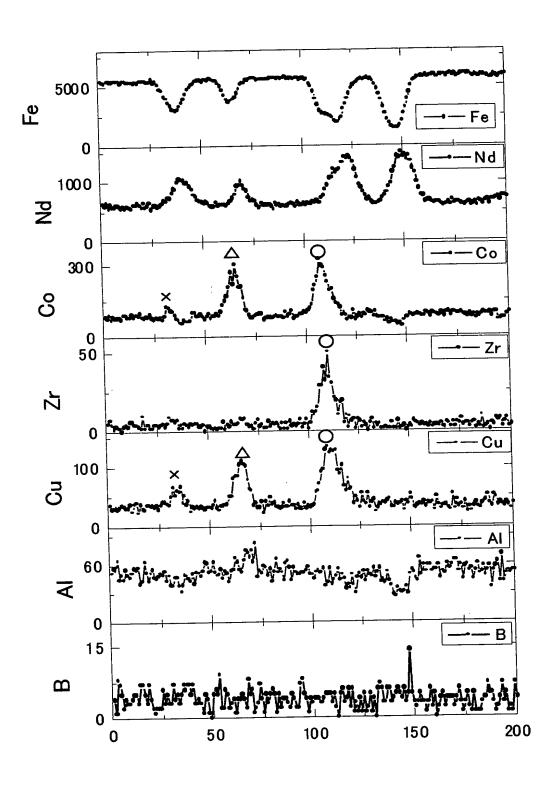
Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 23 of 33

第23図



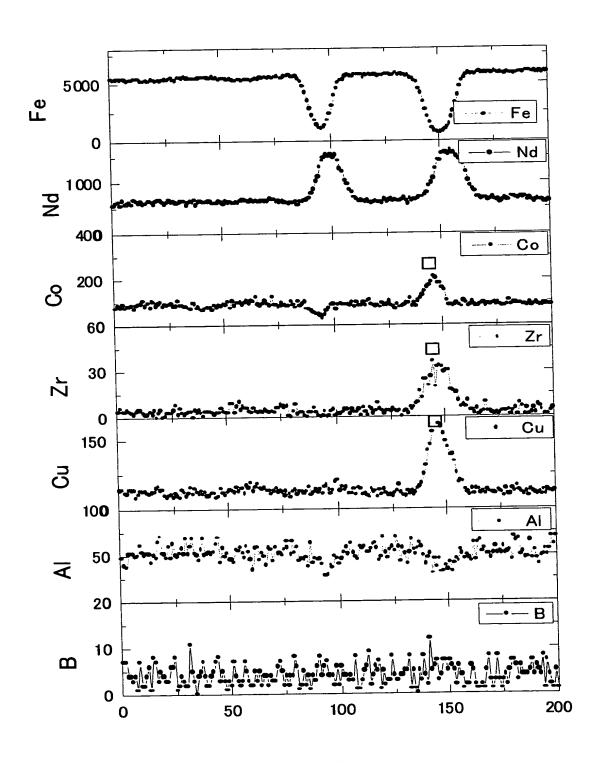
Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 24 of 33

第24図



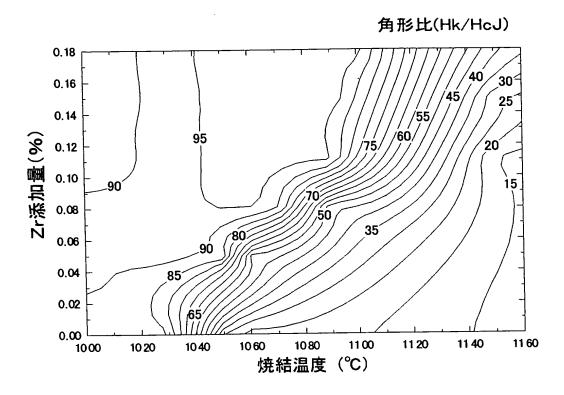
Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 25 of 33

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Hogan & Hartson 81864.0024 Gouichi NISHIZAWA et al. R-T-B System Rare Earth... EV 324 110 437 US 33 Drawing Sheets; Sheet 27 of 33

					٥	- 5	1	R-+0-1
S S	最終組成(wt. %)	低R合金	高R合金	高R合金 焼結温度	(kG)	(kOe)	(KG) (KOe) (%) × HcJ	X 유
76	76 Fe-25 0Nd-5 3Pr-18-0 05Cu-0 2AI-0.5Co-0.13Zr	合金a4		1060°C 14.42 12.62	14.42	12.62	98	15.68
7	77 Fe-23 2Nd-5 4Pr-2 1Dv-1B-0.05Cu-0.2Al-0.5Co-0.13Zr		∳ \$51	1070%	13.68 17.3	17.3	97 15.41	15.41
, ,	79 EconeNd_5 Ab.~4 70.~1B-0 05C0 2AI-0 5Co-0 13Zr 合金a1+合金a2+合金a3	合金a1+合金a2+合金a3	- 2 3 1		13.19	13.19 23.23	86	15.51
0 0	79 Fe 20:000 3:41 4:75			1090°C _{12.37} 30.51 94 15.42	12.37	30.51	94	15.42

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, 		PN		Ŋ	රි	రె	₹	മ	- 7r	TT.
種別		(wt%)		(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	
	低R合金	23.6	0.9	0.3		0.05	0.23	1.1	0.11	bal.
∢	高R 合金	40.6			5.0	0.05	0.23		1	bal.
	70	25.0		0.3	0.5	0.05	0.23	1.0	0.10	bal.
	氏合金	23.6	6.0	0.3	1	0.05	0.23	1.1		bal.
ω	画 日 日 日 日 日	40.6	1	l	5.0	0.05	0.23	0.5	2.0	bal.
	焼結体組成	25.0	5.3	0.3	0.5	0.05	0.23	1.1	0.10	bal.

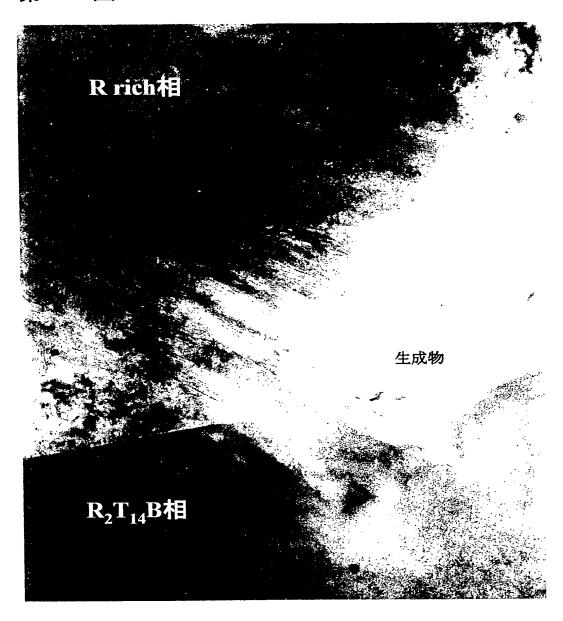
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焼結温度 [°C] 1050 世 万 22.7 生成物のサイズ(平均) 短径[nm] 5 長径[nm] 166 310 [mdd] 300 350 Z_2 [bbm] 670 850 O_2 Zr添加量 [wt%] 0.1 0.1 低R合金 商R合金 種別 ∢ \mathbf{m}

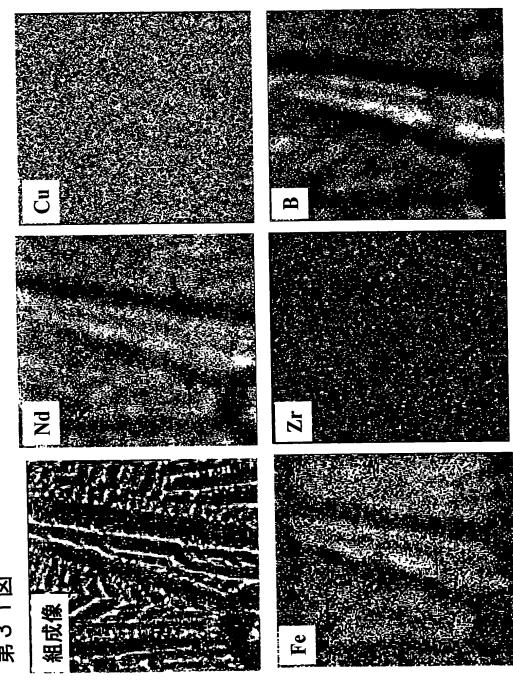
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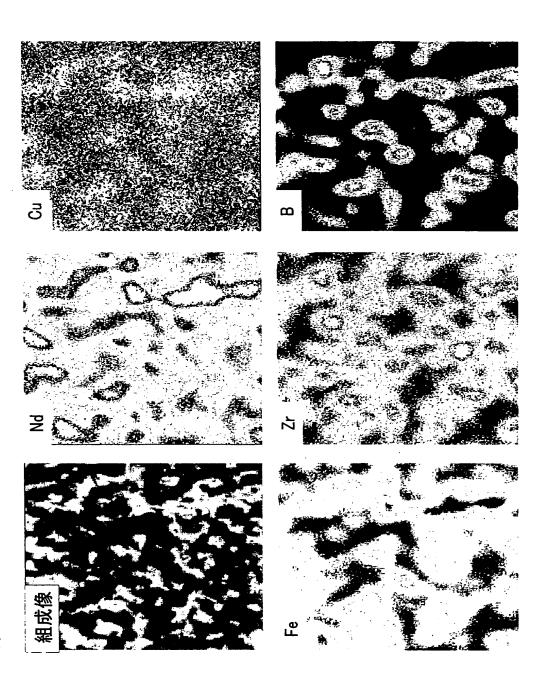


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o Z	最終組成(wt. %)	酸素量 (ppm)	低R合金	國R 合金	低R合金 高R合金 焼結温度	Br (kG)	HcJ (kOe)	Br HcJ Hk/HcJ Br+0.1 CV値 (kG) (kOe) (%) ×HcJ	Br+0.1 × HcJ	CV値
&	80 Fe-28.3Nd-0.1Dy-1B-0.03Cu-0.05Al-0.2Co-0.07Zr	720	合金a7	合金b4	合金a7 合金b4 1070°C 14.62 13.1 98 15.93 7	14.62	13.1	86	15.93	77
8	81 Fe-26.9Nd-4.8Pr-0.2Dy-1.3B-0.3Cu-0.25Al-4Co-0.24Zr	980	合金a8	合金b5	合金a8 合金b5 1020°C 13.88 15.3 96 15.41 9	13.88	15.3	96	15.41	86

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